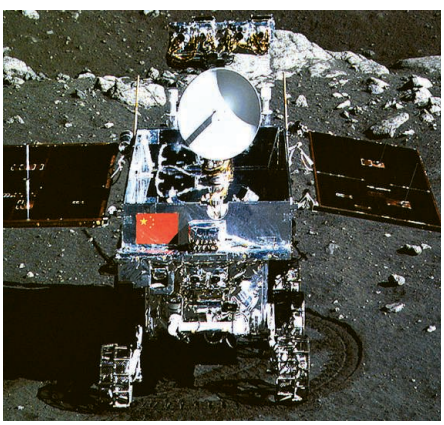
Edited by **Jennifer Sills**

China's robotics successes abound

THE IN BRIEF NEWS STORY "China's lunar rover languishes" (6 June, p. 1067) should be put in the context of China's ambitious robotics development, which began more than 40 years ago. Recent advances in robotics have allowed China to explore extreme environments such as space, natural disaster areas, the deep sea, and the North and South Poles. The lunar rover Yutu ("Jade rabbit"), discussed in the News



Yutu, China's lunar rover.

PHOTO: CHINA STRINGER NETWORK/REUTERS

story, landed successfully on the Moon in December 2013. Robotic manipulators and mobile robots are envisaged to play an important role in the ongoing Chinese Space Station project and future missions to the Moon and Mars. Three different types of robots were deployed to assist the search and rescues after the Ya'an earthquake in 2013 (*1*). In deep-sea exploration, Chinese manned submersible vessel Jiaolong reached a record depth of 7062 m in 2012 (*2*). China also applied robotic technologies during various expeditions to the Poles, including to the Arctic in 2008 and 2010 and to Antarctica in 2007 and 2012 (*3*, *4*).

Recent events, such as Yutu's locomotion problem and the absence of underwater robots during the search for the missing flight MH370, reveal the limitations of existing robotic technologies and highlight directions for potential improvement. Chinese roboticists acknowledge the technical challenges in achieving robust, reliable, and autonomous operations in space and the deep sea. Their approach has been to adopt state-of-the-art solutions proposed by the international robotics community rather than relying on home-grown innovations. This has worked particularly well with developing software-based techniques such as control and computing algorithms. The biggest weakness in advanced robotics in China is in high-performance mechatronics. This is because China lacks high-precision, industrial manufacturing capabilities, and as a result, depends on expensive imports of components from the United States, Europe, and Japan. The robotics community in China is striving to improve their influence in large national R&D programs as well as to foster concrete international collaborations to help enhance their capabilities in both theoretical research and hardware development.

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Semantic priming well established

AMIDST THE RECENT furor over failures to replicate some empirical results on behavior priming by social psychologists ("Fresh misconduct charges hit Dutch social psychology," F. v. Kolfschooten, News & Analysis, 9 May, p. 566; "Replication effort provokes praise—and 'bullying' charges," J. Bohannon, In Depth, 23 May, p. 788; "Psychologist's defense challenged," F. v. Kolfschooten, In Depth, 30 May, p. 957), it is important to emphasize that some basic behavior-priming effects are real, robust, and easily replicable even if others are much more problematic.

For example, if an English reader is presented with a printed word like "dog," then on average, s/he will be at least 10 to 20% faster at recognizing and responding to a subsequent associated word like "cat" when it is presented within a few seconds after the previous word. This psychological phenomenon, called "semantic priming," has been demonstrated many times during past decades; the mental processes and brain mechanisms that mediate it are at least moderately well understood (*1*–*3*). Many other highly reliable priming phenomena like this have been found in human perception, memory, and language processing (*4*). Consequently, in his 23 May In Depth story, J. Bohannon's statement that "…for behavior priming…the results [of recent replication attempts] are particularly grim" should have been much more carefully qualified.

To be specific, the recent failed replication attempts concern much more exotic types of putative behavior priming [e.g., the ones reported originally in (*5*–*8*); see (*9*)]. Viewed from a metaphorical perspective, what some social psychologists have done is essentially like trying to show that presenting the printed word "dog" may incline English-reading adult male humans more toward visiting remote "cathouses" (slang for brothels) even after substantial amounts of time (several minutes or more) have elapsed since the original exposure to "dog." Much further research is needed for assessing to what extent such behavior-priming effects are real. Meanwhile, until the necessary research has been completed, journalists in the public news media [e.g., (*10*)] and scientist authors of popular best-selling books [e.g., (*11*)] that prominently tout these less-substantiated, albeit intriguing, phenomena should treat them with considerable caution, uncertainty, and skepticism.

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9. For example, Bargh *et al.* (*5*) claimed that surreptitiously exposing college students to printed words like "bingo," "gray," and "Florida," which may be related to old age in the United States, primed them to walk more slowly as they later exited the laboratory. However, multiple failures to replicate this specific behavior-priming effect have been subsequently reported (*12*,*13*).
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Eyeing visual pathways in dyslexia

IN THEIR REPORT "Intact but less accessible phonetic representations in adults with dyslexia" (6 December 2013, p. 1251), B. Boets *et al.* show convincingly that adults with dyslexia exhibit normal neural representations of speech phonemes. They suggest that the core problem in dyslexia is defective access to normal phonetic representations. Poor access is supported by the finding of weaker connectivity between the Wernicke's and Broca's areas in their dyslexic subjects. However, their conclusion overlooks the possibility of defects in the visual system before the signals from reading a text reach the phonological realm; with certain words, signals never even enter the phonological route. Although most people with reading impairments have severe phonological deficits, mere correlation cannot establish causality (*1*).

People who are illiterate have poorer phonological skills than those who can read, perhaps because reading helps the development of phonemic awareness (*2*). The huge difference in time spent on reading may also explain the connectivity differences found by Boets *et al.* between good and bad readers.

Reading, being a recent historical development, is unlikely to be associated with the evolution of any specific brain area devoted to it, so it probably uses brain functions evolved for other purposes. One such function is postulated to be a top-down attentional mechanism essential for visual search, but co-opted for sequential processing of letters in a text (*3*). There is now substantial evidence demonstrating significant deficits in visuospatial attention in dyslexia (*3*, *4*). Longitudinal studies also predict reading proficiency from performance on visual attention tasks (*5*), and remediation programs involving visual attention rapidly improve reading scores (*6*).

Reading difficulties of dyslexics and their poor access to phonological representations may be independent outcomes of a single underlying deficit. A temporal sampling disorder in speech recognition, recently suggested as a neural explanation for the phonological problems in dyslexia (*7*), may in fact be part of a more general sampling problem that causes parallel deficits in sampling visual stimuli as well (*8*). Thus, phonological difficulties may show correlation with, but not cause, a reading impairment.

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Response

I APPRECIATE VIDYASAGAR'S attempt to point to the important role of visual processing in reading and dyslexia. My colleagues and I have also been investigating visual impairments in (preschool children at risk of) dyslexia (*1*–*3*). However, I don't think that the possible importance of visual skills discredits our findings in any manner.

Vidyasagar emphasizes the importance of excluding deficits in the visual system before identifying one of the downstream stages as the site of the main deficit. However, visual performance is completely irrelevant to our neuroimaging study. Subjects did not have to read at all; they just had to listen to speech sounds and were even instructed to close their eyes. Despite this lack of visual input, the observed pattern of functional and structural brain connectivity related to individual differences in phonology, reading, and spelling.

I agree that problems in visual processing may also result in literacy impairment and that a certain proportion of individuals with dyslexia may indeed present visual processing problems. However, I disagree that this is the primary impairment causing subsequent phonological deficits. There is abundant evidence that individuals with dyslexia do show early phonological impairments, even before going to school or before receiving any reading instruction. Thus, this certainly is not simply a secondary consequence of less print exposure or orthographic skill (*4*, *5*).

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TECHNICAL COMMENT ABSTRACTS

Comment on "Mechanism of eukaryotic RNA polymerase III transcription termination"

Aneeshkumar G. Arimbasseri, George A. Kassavetis, Richard J. Maraia

■ Nielsen *et al.* (Reports, 28 June 2013, p. 1577) characterized their RNA polymerase III (Pol III) preparation and concluded that it requires an RNA hairpin/duplex structure for terminating transcription. We could not corroborate their findings using bona fide Pol III from two laboratory sources. We show that Pol III efficiently terminates transcription in the absence of a hairpin/duplex in vitro and in vivo.
Full text at http://dx.doi.org/10.1126/science.1253783

Response to Comment on "Mechanism of eukaryotic RNA polymerase III transcription termination"

Soren Nielsen and Nikolay Zenkin

■ Arimbasseri *et al.*, in their Comment, suggest that to terminate transcription in vivo, RNA polymerase III uses a mechanism other than hairpin-dependent termination and that properties of purified polymerase may depend on preparation procedure. Evidence suggests that our preparation is indeed different from that of other methods. Our new data suggest that, apart from hairpin-dependent termination, one or more "fail-safe" termination mechanisms may exist in the cell.
Full text at http://dx.doi.org/10.1126/science.1254246